NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE SPECIFICATION
CORRUGATED METAL PIPELINE
(Acre)
CODE 430 II

INSTALLATION

Buried pipelines

Pipe shall be laid to the lines and grades as shown on the drawings and/or as staked in the field, and shall be placed deep enough below the land surface to protect it from the hazards imposed by traffic crossings, farm operations, freezing temperatures, or soil cracking.

The trench bottom shall be uniformly excavated so that the full length of pipe contacts the bottom without bridging. Clods, rocks, and uneven spots that can cause nonuniform support shall be removed.

If trenches are excavated in soils containing rock or other hard material that might damage the pipe or coating material, the trenches shall be over excavated a minimum of 4 in. and then backfilled to grade with consolidated sand or fine earth bedding.

The trench at any point below the top of the pipe shall be only wide enough to permit the pipe to be easily placed and joined and to allow the initial backfill material to be uniformly placed under the haunches and along the sides of the pipe.

Provisions shall be made to assure safe working conditions if unstable soil, trench depth, or other conditions can be hazardous to personnel working in the trench. Trench banks more than 5 ft. high shall be shored, laid back to a stable slope, or equivalent protection shall be provided if personnel are exposed to danger.]

Coated pipe shall be handled in a manner to prevent abrasion of the coating during transportation, placement, and backfilling. Pipe shall not be dropped or allowed to roll down skids without proper restraining ropes. If the pipe must be moved longitudinally along the trench, care shall be taken to assure that the pipe and the coating are not damaged. Pipe shall not be rolled or dragged on the ground. If the pipe is supported, the supports shall be of sufficient width and number and be padded, if necessary, to prevent damage to the coating. Damaged coating shall be repaired before backfilling.

Initial Backfill for Live Loading

Hand, mechanical, or water packing methods shall be used where there is a potential for live loading. The initial backfill material shall be class I, II, III, or IV as described in Figure 1. Initial backfill material, as shown in Figure 2, shall be placed from the bottom of the trench to a depth of 0.7 of the pipe diameter for circular pipe. For arched pipe, the initial fill depth shall be given in Table 6.

Figure 1:

INITIAL BACKFILL MATERIAL DESCRIPTION

Class of Select Initial

Backfill Material	Description
I	Angular, 1- to ¼-in. size, graded crushed stone with a maximum of 10% non-cohesive stone with a maximum of 10% non-cohesive fines.
II	Coarse sands (>0.5 mm) and gravels with maximum particle size of 1 in. including sands and gravels containing a maximum of 12 % non-cohesive fines. Soil types GW, GP, SW, and SP are included in this class.

III	Fine sand and clayey gravels, including fine sands, sand-clay mixtures, and gravel-clay mixtures. Soil type GM, GC, SM, and SC are included in this class.
IV	Silt, silty clays, and clays, including inorganic clays and silts of medium plasticity and liquid limit. Soil types ML and CL are included in this class.

(SEE FIGURE 2)

TABLE 6 – Depth of initial backfill for arched pipe

Steel Pipe Span (in.)	Aluminum Pipe Span (in.)	Corrugations 2-2/3" x ½"	Corrugations 3" x 1"
18	17	0.4	-
22	21	0.4	-
25	24	0.4	-
29	28	0.5	-
36	35	0.5	-
43	42	0.6	0.8
50	49	0.7	0.9
58	57	0.8	1.0

All initial backfill material shall be free from rocks and hard earth clods larger than 3 in. in diameter. It shall not contain frozen material, sod, cinders, or earth containing a high percentage of organic material.

At the time of placement, the moisture content of the material shall be such that the required degree of compaction can be obtained with the backfill method to be used. The initial backfill material shall be placed so that the pipe will not be displaced, excessively deformed, or damaged.

If backfilling is done by hand or mechanical means, the initial fill shall be compacted firmly in 4 in. to 6 in. lifts around the pipe, as required in Figure 2 or Table 6, (to provide adequate lateral support to the pipe). Each lift shall be shoveled and tamped between the pipe and the side of the trench to provide satisfactory pipe support. Care shall be taken to assure that backfill is placed under the haunches of the pipe sufficiently to fill all voids and provide uniform bearing.

The GC and SC of Class III and all Class IV initial backfill material, shall be compacted to a density equal to or greater than the surrounding soil material.

If the water packing method is used, the pipeline shall first be filled with water. The initial backfill, before wetting, shall be of sufficient depth to insure a final depth of 0.7 of the pipe diameter for circular pipe or the depth required in Table 6 for arched pipe after consolidation. Water packing is accomplished by adding water to dike reaches of the trench in suffficient quantity to thoroughly saturate the initial backfill. The backfill shall then be vibrated sufficiently to fill all voids under the pipe. The amount of water used for consolidation shall be controlled to insure no pooling of excess water. After the backfill is saturated, the pipeline shall remain full until after the final backfill is made. The wetted fill shall be allowed to dry until firm before beginning the final backfill. Water compaction shall be used only on soils that are well drained.

GM and SM of Class III soil material and Class IV soil material shall not be water compacted.

Final Backfill

The final backfill material shall be soil or sand, free of hard earth clods larger than 3 in. in diameter or stones greater than 1 in. diameter, to a depth of 6 in. over the pipe. The remaining final backfill material shall be free of large rocks, frozen clods, and other debris greater than 3 in. in diameter. The material shall be placed and spread in approximately uniform layers so that

there will be no unfilled spaces in the backfill. The backfill shall be placed to the level of the natural ground, or to the design grade required to provide the minimum depth of cover after settlement.

Rolling equipment shall not be used to consolidate the final backfill until the specified minimum depth of cover has been placed.

All special backfilling requirements of the pipe manufacturer shall be met.

Backfill for Nonlive Loading

In the situations where there is no potential for live loading, the "Initial backfill" criteria shall only apply to backfilling under the haunches of the pipe. The remaining backfill shall be according to "final backfill" criteria.

Aboveground Pipelines

Concrete, timber or other pipe supports, and anchor and thrust blocks shall be constructed at the locations and to the dimensions shown on the drawings and/or as staked in the field.

Onground Pipelines

Pipe shall be laid to the lines and grades shown on the drawings and/or as staked in the field. The ground shall be shaped so as to provide support. If there are rocks or objects that might damage the pipe coating, sand or fine soil shall be used as a base for the pipe.

Concrete, timber, or other anchors and thrust blocks shall be constructed at the locations, to the dimensions shown on the drawings, or as staked in the field or both.

Paint

All field welds and all exposed metal shall be thoroughly cleaned and painted with two coats of zinc dust-zinc oxide primer, Type III paint described in the Materials section of this Specification.

Any damaged polymer coating shall be thoroughly cleaned and painted with a polymer paint compatible with the pipe polymer coating in accordance with the recommendation of the manufacturer.

Joints and Connections

All joints and connections shall be capable of withstanding the design maximum working pressure for the pipeline without leakage and shall leave the inside of the line free of any obstruction that can reduce its capacity below design requirements. Gaskets shall be installed according to the recommendations of the pipe manufacturer.

All fittings, such as couplings, reducers, bends, tees, and crosses, shall be installed according to the pipe manufacturer's recommendations.

Fittings and appurtenances made of unprotected steel or metals susceptible to corrosion shall be adequately protected by wrapping them with plastic tape or applying a coating having high corrosion preventing qualities. If plastic tape is used, all surfaces shall be thoroughly cleaned and coated with a primer compatible with the tape before wrapping them.

On buried pipelines where cathodic protection is required, high-resistance joints between pipe lengths shall be electrically bridged with a welded, brazed, or soldered copper wire not smaller than 4/0 gauge. After the joints are welded, they shall be covered with a coating equal in quality to that specified for the pipe. Dielectric connections shall be placed as specified on the drawings.

Cathodic Protection

Buried pipelines shall be protected with sacrificial galvanic anodes if they are specified to supplement the protection provided by the pipe coating. The anodes shall be of the kind and number specified for the job or as shown on the drawings, or both. Anode materials shall be as specified under "Materials".

Anodes shall be placed as shown on the drawings and shall be bedded in moist clay, clay loam, silt loam, or silt. In sandy and gravelly areas, fine material must be imported for bedding and for covering the anodes to a depth of 6 in. The packaged anodes and the fine textured soil used for bedding and backfill shall be thoroughly wetted.

Testing station facilities shall be located and installed as specified for the job, as shown on the drawings, or both. Wires at testing stations shall be attached to the pipe by one of the processes specified for anode lead wires.

Testing

Underground pipelines shall be tested before placing the backfill over the field joints. Aboveground pipelines may be tested at any time after they are ready for operation. Any joints that are leaking more than acceptable for that type of joint shall be repaired.

It shall be demonstrated that the pipeline will function properly at and below design flow.

MATERIALS

Appurtenances

Standard fittings shall be used for the pipe. Elbows, tees, crosses, reducers, gate valves, check valves, air-and-vacuum-release valves, and pressure-relief valves shall be of the size and material specified or as shown on the drawings. Steel supports and saddles shall be constructed of material that equals or exceeds the requirements specified in ASTM A 36, "Structure Steel."

Pipe

Seams of pipe shall be welded or sealed. Helical pipe shall have annular ends. Pipe shall equal or exceed the requirements specified in one of the following standards:

- ASTM A 760 Pipe, Corrugated Steel, Zinc-Coated
- Fed. Spec, WW-P-402C Pipe, Corrugated (Aluminum Alloy (Amendment-1)
- Fed. Spec. WW-P-405B Pipe, Corrugated (Iron or Steel, Zinc Coated (Amendment-1))
- AASHTO M 36 Zinc Coated (Galvanized) Corrugated Iron or Steel Culverts and Underdrains
- AASHTO M 196 Corrugated Aluminum Alloy Culverts and Underdrains (Amendment AASHTO M 196)
- AASHTO M 245 Pre-coated, Galvanized Steel Culverts and Underdrains
- AASHTO M 274, Steel Sheet, Aluminum Coated (Aluminized Type II) by the Hot Dip Process for Sewer and Drainage Pipe

Coating

If an interior and/or exterior coating is required, the coating shall meet the requirements of either Federal Specification WW-P-405B, Pipe Corrugated (Iron or Steel, Zinc-Coated (Amendment-1)), AASHTO M 190-78, Bituminous Coated Corrugated Metal Culvert Pipe and Pipe Arches (Amendment M 190-80I), or AASHTO M 246-74 Pre-coated, Galvanized Steel Sheets for Culverts and Underdrains.

Paint

Paint shall meet the Federal Specification TT-P-641G, Primer Coating, Zinc Dust-Zinc Oxide (for galvanized surfaces).

Anodes

Zinc anodes must meet or exceed the requirements specified in ASTM B 418, "Cast and Wrought Galvanic Zinc Anodes for use in Saline Electrolytes."

Each anode shall have a full length core with a single strand of insulated copper wire solidly attached to it. The wire shall be No. 12 or larger. If a header wire is used, the gage must be adequate to carry the design current with no more than a 20-mV IR drop.

All anodes shall be commercially packaged. The packaged backfill mix shall be of the following proportions by weight.

Zinc……20 to 30 pct bentonite: 70 to 80 pct gypsum

Magnesium…20 to 25 pct bentonite: 70 to 75 pct gypsum:

5 pct sodium sulfate

Connection Bands

Bands or couplers shall either meet the federal, ASTM, or AASHTO specifications detailed under "Pipe" except no flange (channel), smooth slab, or dimpled band shall be used. The selected band must provide a water tight joint.

Gaskets

Gaskets shall meet the requirements of ASTM C 443-79, Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.